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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/733,269	12/12/2003	Taiji Torigoe	246584US-6CONT	8642

22850 7590 02/07/2006

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EXAMINER	
TUROCY, DAVID P	

ART UNIT	PAPER NUMBER
1762	

DATE MAILED: 02/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/733,269	TORIGOE ET AL.	
	Examiner	Art Unit	
	David Turocy	1762	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 December 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,6,9,10,12,15,18-24 and 26-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4,6,9,10,12,15,19-24 and 26* is/are rejected.

7)☐ Claim(s) *18,27 and 28* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/12/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The applicant's amendments, filed 12/16/2005, have been fully considered and reviewed by the examiner. In light of the amendments to claims 1, 4, 10-14 the 35 USC 112 1st paragraph rejection over new matter has been withdrawn. In light of the amendments to claims 1, 4, 6, 9, and 21 to correct awkwardness and punctuation errors, the examiner has withdrawn the 35 USC 112 2nd paragraph rejection to the claims. The examiner notes the cancellation of claims 11, 13, 14, 16, 17, and 25 and the addition of new claims 27 and 28. Claims 1,4,6,9,10,12,15,18-24, and 26-28 remain pending in the application.

Response to Arguments

2. Applicant's arguments, filed 12/16/2005, with respect to claim 14 (said topcoat layer and another topcoat layer are formed of different material) have been fully considered and are persuasive, wherein it was not demonstrated that one of ordinary skill in the art would reasonable expect success because of the material compatibility and/or bonding characteristics (See Remarks, page 9). The 35 USC 103(a) rejections to the claims have been withdrawn.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on 12/12/2003 was not fully considered because AW was not supplied in English. However, AW reference was

cited on the English translation of the international search report, which constitutes a clear and concise translation of the reference. Therefore, the submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1, 4, 12, 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khan et al. (2002/0164417 A1).

Khan teaches a method of repairing a Ni-based alloy part having an undercoat (bond) layer and a topcoat (thermal barrier coating, TBC) (abstract; p. 2). Khan teaches of a turbine component with an undercoat comprising MCrAlY and a topcoat comprising a ZrO_2 based ceramic (P2-3). Khan teaches removal of the TBC and bondcoat only in localized areas of damage, followed by replacement with another different undercoat layer, such as by slurry spraying (P26), and with another topcoat layer of ZrO_2-based ceramic and teaches forming a topcoat by electron beam process (Paragraph 0003, 0022).

Khan fails to discloses the first topcoat and another topcoat comprise different materials. However, Khan clearly discloses the turbine blade, comprising a yttria stabilized zirconia as the first thermal barrier coating, see paragraph 0003 and 0019, and discloses applying another top coat comprising zirconia stabilized by materials other than yttria, including magnesia, ceria, and oxides of rare earth group (paragraph 0022).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Khan to use the any second topcoat to provide a desirable turbine repair with a reasonable expectation of success, including a second material different from the first because Khan discloses any number of different materials is known in the art to be a replacement ceramic thermal barrier coating for the known and conventional yttria stabilized zirconia.

Regarding the spray velocity, Khan makes no reference to a specific spray velocity, but inherently has a spray velocity. It is examiners position that it is within the skill of one of ordinary skill in the art to select a spray velocity high enough for the particles to reach the substrate but low enough as to not cause disrupt to the process, i.e. damage the substrate, damage the spray particles, and/or damage the adhesion of the particles because they are bouncing off the substrate. Therefore, since there is no showing of a specific velocity by Khan, it would have been obvious to optimize the value for the spray velocity to provide a proper repair of the substrate. It is well settled that determination of optimum values of cause effective variables such as these process parameters is within the skill of one practicing in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980).

Regarding the base material temperature at spraying, Khan does not teach a specific temperature. However, in the absence of a showing of criticality, it is Examiner's position that selection of room temperature and conditions, which lie below 300 °C, as required by Applicant in claim 1, would have been obvious to an ordinary artisan. Additionally, Kahn teaches drying after coating at a temperature of 20-100°C, lying within the range claimed by Applicant.

Regarding claims 22, the replacement coatings of Khan are selected for use in gas turbine engines of harsh environments and are known for excellent oxidation resistance.

7. Claims 1, 4, 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rigney et al. (6,274,193) in view of Rigney et al. (6,042,880) and further in view of Khan.

Rigney '193 teaches repairing Ni-based alloy parts having an undercoat (metallic environmental resistant coating) and a topcoat (TBC) by removing the topcoat layer and undercoat layer corresponding to the damaged area and subsequently spraying another undercoat layer thereon and applying another topcoat layer (abstract; Figure 2; col. 3, line 33; col. 4, line 13-24; col. 5, lines 34-44; col. 6). Rigney '193 teaches local repair because complete removal of a layer results in detrimental wall thinning of the base part. Rigney '193 teaches that the undercoat, the metallic layer, may be applied by spraying (col. 6, line 7).

Rigney '193 teaches of application of a ceramic thermal barrier overcoat, but fails to disclose a zirconia-based ceramic as the upper layer.

However, Rigney '880 teaches a typical thermal barrier system is based on a zirconia stabilized by yttria, in particular ZrO_2-$8Y_2O_3$ (Column 1, lines 18-30). Rigney '880 discloses ZrO_2-$8Y_2O_3$ is commonly utilized for turbine engine components and deposited by electron beam deposition (Column 1, lines 18-30).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Rigney '193 to use the outer layer of zirconia based ceramic and in particular ZrO_2-$8Y_2O_3$ as suggested by Rigney '880 to provide a

desirable ceramic outer layer for a turbine blade because Rigney '880 discloses a ZrO_2-$8Y_2O_3$ is known in the art to provide an outer ceramic layer for turbines and therefore would reasonably be expected to effectively provide protection for a turbine engine in a corrosive environment.

Rigney '193 in view of Rigney '880 fails to teach of removal of only a portion of the topcoat and application of another topcoat different from the first.

However, Khan, discussed above, teaches repairing the thermal barrier coating by removing only the locally damaged TBC material, including the material in the viscinity of the damage, and discloses by removing only a limited amount of TBC saves both time and investment cost.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Rigney '193 in view of Rigney '880 to only remove a portion of the TBC as suggested by Khan to provide a desirable turbine repair with a reasonable expectation of success to reap the benefits of improved time and cost of repair.

Rigney '193 in view of Rigney '880 in view of Khan fails to explicitly discloses the first topcoat and another topcoat comprise different materials. However, Khan clearly discloses the turbine blade, comprising a yttria stabilized zirconia as the first thermal barrier coating, see paragraph 0003 and 0019, and discloses applying another top coat comprising zirconia stabilized by materials other than yttria, including magnesia, ceria, and oxides of rare earth group (paragraph 0022).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Khan to use the any second topcoat to provide a desirable turbine repair with a reasonable expectation of success, including a second material different from the first because Khan discloses any number of different materials is known in the art to be a replacement ceramic thermal barrier coating for the known and conventional yttria stabilized zirconia.

Regarding the spray velocity, Rigney '193 makes no reference to a specific spray velocity, but inherently has a spray velocity. It is examiners position that it is within the skill of one of ordinary skill in the art to select a spray velocity high enough for the particles to reach the substrate but low enough as to not cause disrupt to the process, i.e. damage the substrate, damage the spray particles, and/or damage the adhesion of the particles because they are bouncing off the substrate. Therefore, since there is no showing of a specific velocity by Rigney '193, it would have been obvious to optimize the value for the spray velocity to provide a proper repair of the substrate. It is well settled that determination of optimum values of cause effective variables such as these process parameters is within the skill of one practicing in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980).

Regarding the base material temperature at spraying, Rigney '193 does not teach a specific temperature. However, in the absence of a showing of criticality, it is Examiner's position that selection of room temperature and conditions, which lie below

300 °C, as required by Applicant in claim 1, would have been obvious to an ordinary artisan.

Regarding claims 4 and 23, Rigney '193 teaches that the replacement TBC may be applied by electron beam physical vapor deposition (col. 6, line 40).

Regarding claims 22, the replacement coatings of Rigney '193 are selected for use in gas turbine engines of harsh environments and are known for excellent oxidation resistance.

8. Claims 6, 9, 15 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khan in view of Sangeeta (6,485,780).

Khan teach that which is disclosed above regarding spray-coating the new undercoat layer for a Ni-based alloy part, but fail to teach the reduced pressure used, as required by claim 6.

Sangeeta teaches a method of repairing similar products in which a replacement metal is applied to the substrate while diffusion heat treating, such treatment is said to occur in inert gas atmosphere or in a vacuum (col. 8, line 8; col. 7, line 31).

Since Khan teaches application of metal repair coatings similar to that of Sangeeta, and Sangeeta teaches that inert gas atmosphere or a vacuum may be used during such repair coating, Sangeeta would have reasonably suggested the use of

reduced pressure in the method of Khan. It would have been obvious to one of ordinary skill in the art to use vacuum pressure conditions, using the teachings of Sangeeta, in the methods of Khan because Sangeeta teaches the interchangeability of atmospheric inert gas conditions and vacuum conditions in such repair coatings. Additionally, in the absence of a showing of criticality, selection of a suitable pressure by an ordinary artisan would have been obvious as a cause-effective variable, as outlined above.

Regarding claim 9, electron beam PVD of the TBC is taught by Rigney '193, as outlined above. Regarding the limitation of applying the basecoat by plasma spray, Examiner notes that Khan teach spraying and that Khan teaches that the localized repair methods avoid the use of the traditional methods of recoating damaged substrates by plasma spraying. While it is taught to be unneeded in such local repair, it is Examiner's position that application by plasma spraying is taught to be well known in the art and would have been an obvious type of spraying for use in the methods of Khan in view of Sangeeta.

9. Claims 6, 9 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rigney '193 in view of Rigney '880 and Khan and further in view of Sangeeta (6,485,780).

Rigney '193 in view of Rigney '880 teach that which is disclosed above regarding spray coating the new undercoat layer for a Ni-based alloy part, but fail to teach the reduced pressure used, as required by claim 6.

Sangeeta teaches a method of repairing similar products in which a replacement metal is applied to the substrate while diffusion heat treating, such treatment is said to occur in inert gas atmosphere or in a vacuum (col. 8, line 8; col. 7, line 31).

Since Rigney '193 in view of Rigney '880 teach application of metal repair coatings similar to that of Sangeeta, and Sangeeta teaches that inert gas atmosphere or a vacuum may be used during such repair coating, Sangeeta would have reasonably suggested the use of reduced pressure in the method of Rigney '193 in view of Rigney '880. It would have been obvious to one of ordinary skill in the art to use vacuum pressure conditions, using the teachings of Sangeeta, in the methods of Rigney '193 in view of Rigney '880 because Sangeeta teaches the interchangeability of atmospheric inert gas conditions and vacuum conditions in such repair coatings. Additionally, in the absence of a showing of criticality, selection of a suitable pressure by an ordinary artisan would have been obvious as a cause-effective variable, as outlined above.

Regarding claim 9, electron beam PVD of the TBC is taught by Rigney '193, as outlined above. Regarding the limitation of applying the basecoat by plasma spray, Examiner notes than Khan and Rigney '193 teach spraying and that Khan teaches that the localized repair methods avoid the use of the traditional methods of recoating damaged substrates by plasma spraying. While it is taught to be unneeded in such

local repair, it is Examiner's position that application by plasma spraying is taught to be well known in the art and would have been an obvious type of spraying for use in the methods of Khan or Rigney '193 in view of Sangeeta.

10. Claims 10 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khan or Rigney et al. (6,274,193) in view of Rigney et al. (6,042,880) and Khan and further in view of EP 1085109 A1 by Alperine et al.

*** Please note US Patent 6333118 by Alperine et al. is the patent, which issued from the patent family member EP 1085109 A1. This patent is being used as an English translation of EP 1085109 A1, therefore all references to column and line number are found in 6333118 ***

Khan and Rigney '193 in view of Rigney '880 and Khan teach all the limitations of these claims as discussed above in the 35 USC 103(a) rejection above, but they fail to explicitly disclose applying a ZrO_2-Dy_2O_3 or ZrO_2-Yb_2O_3 topcoat instead of the removed ZrO_2-$8Y_2O_3$ top ceramic layer.

However, Alperine teaches ZrO_2-Dy_2O_3 ceramic has an advantage of reducing the thermal conductivity of a ceramic to a much greater extent then conventionally used ceramics such as ZrO_2-$8Y_2O_3$ (Column 5, lines 7-15, Abstract, Column 2, lines 40-41). Alperine disclose the ZrO_2-Dy_2O_3 ceramic is deposited on a MCrAlY bond layer (Column 4, lines 21-29).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Khan or Rigney '193 in view of Rigney '880 and Khan to use the ZrO_2-Dy_2O_3 ceramic as the another ceramic overcoat as suggested by Alperine to reap the benefits of a ceramic outer layer with a reduced thermal conductivity.

11. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over either Khan in view of Sangeeta (6,485,780) or Rigney '193 in view of Rigney '880, Khan and Sangeeta (6,485,780) and further in view of EP 1085109 A1 by Alperine et al.

*** Please note US Patent 6333118 by Alperine et al. is the patent, which issued from the patent family member EP 1085109 A1. This patent is being used as an English translation of EP 1085109 A1, therefore all references to column and line number are found in 6333118 ***

Khan in view of Sangeeta and Rigney '193 in view of Rigney '880, Khan and Sangeeta teach all the limitations of these claims as discussed above in the 35 USC 103(a) rejection above, but they fail to explicitly disclose applying a ZrO_2-Dy_2O_3 or ZrO_2-Yb_2O_3 topcoat instead of the removed ZrO_2-$8Y_2O_3$ top ceramic layer.

However, Alperine teaches ZrO_2-Dy_2O_3 ceramic has an advantage of reducing the thermal conductivity of a ceramic to a much greater extent then conventionally used ceramics such as ZrO_2-$8Y_2O_3$ (Column 5, lines 7-15, Abstract, Column 2, lines 40-41).

Alperine disclose the ZrO_2-Dy_2O_3 ceramic is deposited on a MCrAlY bond layer (Column 4, lines 21-29).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Khan in view of Sangeeta or Rigney '193 in view of Rigney '880, Khan and Sangeeta to use the ZrO_2-Dy_2O_3 ceramic as the another ceramic overcoat as suggested by Alperine to reap the benefits of a ceramic outer layer with a reduced thermal conductivity.

Allowable Subject Matter

12. Claims 18, 27 and 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: None of the prior art cited or reviewed by the examiner alone or in combination reasonably suggests only partially removing an undercoat comprising Co-based MCrAlY and replacing only the removed portion with a Ni-based MCrAlY layer. One of ordinary skill in the art would not reasonably expect success substituting different materials because of issues dealing with compatibility between the two materials.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Turocy whose telephone number is (571) 272-

2940. The examiner can normally be reached on Monday-Friday 8:30-6:00, No 2nd Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

David Turocy
AU 1762

TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER